

Spatio-Temporal Proximity Assistance

‘Zambeel’ – a Prototype Application for Procurement

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Abstract—Ample amount of time spent in locating, finding and procuring desired items in wish list of our daily life necessities. Usually the list of desirable items is prepared when the person is not near to desired items. It would be convenient to have an assistance application that lure people on the go, to procure item of desire. This must require a two tier information sharing system, one at procurer and other at vendor. Procurer add item to the wish list and vendor add offer that must comply with transaction, valid and existence time with respect to determined geo-location. Therefore, a system with mobile application named ‘Zambeel’ is presented that enable procurer to locate vendors for their required things. The idea is to produce geographically aware application for mobile devices that would automatically notify users to get location on map even on the go.

Keywords—Spatio-temporal; geo-fence; smart personal assistant; push notification; IoT; cloud

I. INTRODUCTION

This work is based on mobile application that makes use of GPS and internet (GPRS/Wi-Fi) and a web service. The mobile application is developed for both Seller and Buyer. There is sign up option as a Seller or Buyer. The Seller should sign up from his shop so that his device GPS gets his location. That will help in making a Go fence around his shop. We fence a specific area whenever we enter in the fenced zone, we will received a message or an alert. After registration all available items are shown to him from where he can select the items that are available on his shop and post them to server. Buyer can see the list of available items if he is sign up successfully. He can mark his required items and can store them. Buyer can see all shops where his required items are available items. Selected items are stored on web service and also in the device in SQLite database so that whenever they want to see items it should be shown to them at once otherwise it will take a while to get from the server. The buyer can see the shop on map.

The web service is responsible for keeping the record of all Buyers and Sellers, available category and items in that category and maintaining logs. The web service is responsible for keeping the records of customers. If the customer is not registered but trying to access items the web service generates

error for that particular caller and invoke the mobile-based application to open the registration form on customer’s mobile phone. A unique 64-bit hex string is treated as buyer and seller’s ID. The aims of the work is to develop a native android application based on networking for showing the location of markets or shops and to limit the time wasted in finding the shops as shown in Fig. 1. The objective of the work is to create a native Android social. Main objectives of this work is Time saving, Easy way, to purchase items, Find the exact location. To suggest things in need when in vicinity/proximity. Mark as required things when you feel their need. Notification pop up and suggest needed things as you pass by/come near. Purpose of this prototype smart personal assistant, ‘Zambeel’ is to make to your shopping easy. Through this application you add the required items and whenever you enter the fence area you will receive a notification. This is a time saving application, and easy way to purchase your required item. Mostly we forget to purchase our necessary item from markets, this application also work as a reminder. Nowadays human is much more dependent on machine and mostly tasks are performed by machines. This application is also one of them which makes human task easy. During shopping mostly we forget any item or some items which we have to buy. This application reminds us every items which we want to purchase.

Spatio-temporal databases applications are based on database that embodies spatial, temporal and spatio-temporal database concepts and captures both spatial (space) and temporal (time) aspects of data. In real world applications often time and space exists together, hence dealing with spatial aspect without considering temporal aspect is of limited use. Examples include location-based services, moving objects, traffic jam preventions, whether prediction. Some more applications encapsulate events in space and time, objects (positions) valid on a time interval, mobile objects, regions with instantaneous existence. The spatial properties represent following characteristics:

- Metric.
- Directional.
- Topological.

These properties may suffer changes during following actions:

- *Translation*: changing of position.
- *Rotation*: changing of direction.
- *Expansion or contraction*: changing of direction size
- *Mutation*: changing of shape.

Practically, the properties of a single ST object may include:

- Non-spatial, non-temporal (thematic): without spatial or temporal meaning.
- Spatial (geometric): usually – objects with complex structure.
- Temporal (non-spatial): thematic time-varying attributes + time attribute.
- Spatio-temporal: spatial attribute + time attribute.



Fig. 1. A generic perspective of application [20].

II. RELATED WORK

In this modern era, Geofence technology has many practical or real world application and their uses. In smartphone, there are many applications available which included the geo fence technology like vouchercloud, Uber, Walmart, etc. A vouchercloud app serves as a digital voucher, when used within 200m range nearest to store. The list of products like Chocolate, Papa John's, etc. is receive in smartphone with 45% of discount, user easily book their voucher. A Geofence is a virtual perimeter of interest around a location. You can create Geofences of 50 to 50,000 meters radius that can be set up to fire location-based notifications when it is entered or exited, or both. The idea presented in this research paper is to receive the News Alert based on network and geo-fencing technique in a particular area. By using the location capabilities in smartphones, smart computers and other devices when user enter, leaves or approaches to geo-fence boundary then the event will triggered in his area. By

using geo-facing technique user get those current affairs which he take interest. Any time user receive the News alert from his region; user also alerts the other people. They described accidental monitoring system with the help of automatic geo-fencing based on GPS technology. The advantage of this monitoring system is that during accident detection, it prevent the loss of life and decrease the delay time in medical treatment, for both purposes accidental detection and vehicle thieving they are using the shock sensor. For over speeding purposes they are using speed sensor which capture the speed of vehicle to avoid the rough driving and car undertaking. They presented the awareness about the geo-fencing technology and discuss about it that geo fencing technique allows the user to get alerts within the boundaries in personalized manner. Fencing situation is highly impact on large number of human activates like healthcare, media, advertisement, mobility. To find taxicabs and save the time passenger, the two things are the most important. Avoid the unnecessary traffics and reduce the traffic we recommended the taxi recommender system which support the pick-up behavior, and the pattern of passenger travel in taxies. They analyze the four factors which save the time of passenger and taxicabs cruises, they studied the historical data on the basis of spatio-temporal relation and graph model based on location to location. The idea presented in [1] about EasyTracker which developed for android users which enables the user for Map Visualization of routes of mobile users and routes of mobile users and storage. The functionality of the EasyTracker application is to provide three common functionalities. User manually annotates their route path describing their behavior and activity [2]. It encapsulates trajectory compression algorithm for the quality movement representation and storage cost [3]. The reliability and stability of the system is calculated in [4] by using real data set [4]. Work shown in [5] automatically track the user segment and auditing the users for manual annotation. It protect the user data especially privacy for sensitive area where recording is not guaranteed. This application use in several ways in real life like Resource Administration and Route planning. In next generation, the location based social network will entertain the user. They presented a TransDec system, with the combination of sensor data, network data, trajectory data and point of interest data. The real world data driven system TransDec's including the three tier architecture. Some spatiotemporal queries introduced in [6] which is supported in TransDec. Work presented in [7] plan to extend the TransDec System which support more complex queries and adhoc queries. They introduce the vision of equipped vehicle with rich instrumentation like internet enabling vehicle's which communicate the nearby vehicle, by doing this we can minimize vehicle crashes, traffic jam problems and save the passenger time. With the cost and its action, Geofencing is the inexpensive technique to make the boundary to our location or area. The technique in [8] easily implemented in restricted areas to give the alert notification who enter and leaves the area, which was implemented in Muscat, Oman, Mazoon University College and observed that this is the better way to track the students and staff. When student enter into boundary of university they receive alert from their time tables, when teacher enter into the university it gives an alert the number of

students waiting in classroom. They model the future generation with the relationship of Geofence with spatiotemporal. Method in [9] supports the normal specification for geo – notification with using transition based behavior model. Geo-fencing technology directly impact on LBS(Location based Service) like process automation or fleet management. Presented a model for indoor environment for Android devices, a cloud based framework which manage the data within sensor and also in cloud and as well as in application, show the visualization part like sensor data, floors map, etc. EnviS toolkit introduced in [10] which manages data management in sensor for visualizing sensor data, according to spatial temporal aspects. App gives different option to user for choosing the historical data, time series visualization and 3D spatial representation. In [11] authors developed a new architecture based on spatial temporal for cloud platform, which included three layers, Infrastructure as a Service, Platform as a Service and Software as a Service. IaaS support the customers deal include the virtual storage, networks and other resources. PaaS supports the running, development and testing. SaaS supports to provide the accessibility of more than one software and application. For the management of big data, they design and implement distributed storage scheme. With the use of global positioning technology (GPS), camera and cloud based service like Google Picasa and Fusion tables, and implemented the concept of spatial temporal databases developed inventory management system which integrates with urban areas inventories and their soil information for modern urban areas for forest management. Quality indicators are used to note soil rating of different plants. Fusion tables provide us to store the information in cloud and share the data through computer, smartphone, etc. devices [12]. Snake model implemented in [13], and introduced new method for tracking cloud and position. In previous level set is used for detection but snake model is more efficient then level set. Combination with geometrical method and tracking algorithm, a history of cloud is obtained. Data is completely organized for the execution of spatio-temporal queries. Survey of cloud computing applications presented in [14] for present era and future generation application and challenges faced from shifting mobile computing to mobile cloud computing. They identified some points or challenges which will faced in next generation name, code, task oriented, security, scalability. A new architecture proposed in [15] for mobile system based on spatio-temporal model and developed protocols which is based on spatio-temporal which maintain and access data under any circumstances. They measure the time delay between the networks and GPS devices. In future they will work on DDSS dengue decision support system and also provide more accurate spatio-temporal access to user for authorization in the uncertainty situation. Proposed novel solution PrivLoc which provide and enable user privacy for Geofencing and location based service to cloud without leakage of any private information of user. Enabling Geofencing service user send data their service provider to check and detect that user crossed a given area which is marked according to Geofence approach. The security of PrivLoc analyzed and checked in [16] that PrivLoc can't leak information of user. The spatial properties include position

and shape, and they have a discrete point-based evolution in time, for example, land parcels as discussed in [19]. However, there are some issues discussed in [17] and [18].

III. PROPOSED SYSTEM AND ARCHITECTURE

The presented work is based on mobile applications that makes use of GPS and internet (GPRS/Wi-Fi) and a web service. The mobile application is developed for both Seller and Buyer. There is sign up option as a Seller or Buyer. The Seller should sign up from his shop so that his device GPS gets his location. That will help in making a Go fence around his shop. We fence a specific area whenever we enter in the fenced zone, we will received a message or an alert. After registration all available items are shown to him from where he can select the items that are available on his shop and post them to server. Buyer can see the list of available items if he is sign up successfully. He can mark his required items and can store them. Buyer can see all shops where his required items are available items. Selected items are stored on web service and also in the device in SQLite database so that whenever they want to see items it should be shown to them at once otherwise it will take a while to get from the server. The buyer can see the shop on map. The web service is responsible for keeping the record of all Buyers and Sellers, available category and items in that category and maintaining logs. The web service is responsible for keeping the records of customers. If the customer is not registered but trying to access items the web service generates error for that particular caller and invoke the mobile-based application to open the registration form on customer's mobile phone. A unique 64-bit hex string is treated as buyer and seller's ID. The aim of this work is to create a native android networking application for displaying the location of markets or shops and to limit the time wasted in finding the shops. Major participants are listed below:

1) Web Application

Web application is responsible for add items according to their product Name and their category selection. All data is save in local database for further operations.

2) Local Database

It is fully responsible to save data in both situation when computer is offline or online, data that come from web application, it synchronize data into the cloud when internet is connected.

3) Cloud Database

Cloud database maintain data that is come from local database and respond data back with buyer and seller demand.

4) Seller

With the help of registration form, which is in native android application, seller fills the form and adds the product with their product name and category selection.

5) Buyer

Buyer is responsible to find the product along with product name and their category and see the map of product where it is present and they save the items present in list. Working of Proposed System is shown in Fig. 2, 3 and 4, respectively

while Fig. 5 shows a snapshot of list of items selected for procurement.

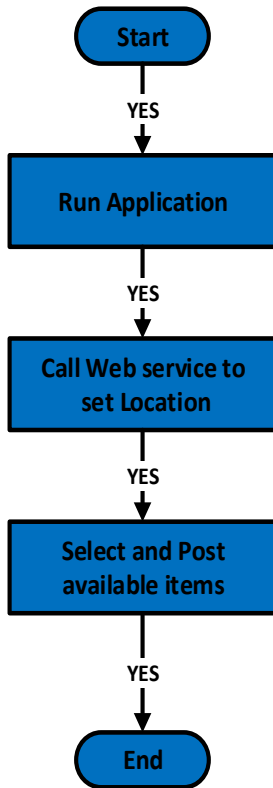


Fig. 2. Flow of offering items by vendor.
Seller Flow Diagram

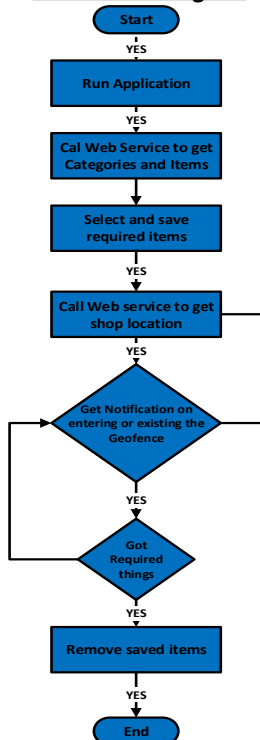


Fig. 3. Customer using offered items of wish list.

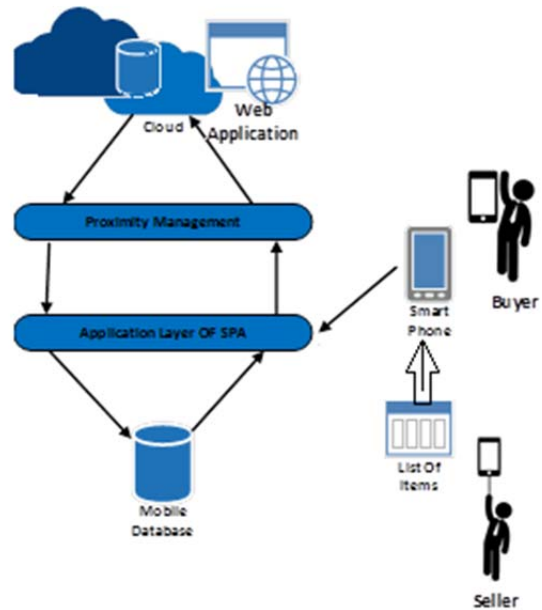


Fig. 4. Work flow of proposed system.

A. Core Functionalities

1) *Location*: To get the location of both i.e. Seller and the Buyer. This is done by the help of Global Positioning System (GPS). Every Android-based mobile phone or tablet has built-in GPS. GPS can communicate with satellites and can get its location in the form of Latitude and Longitude. To use GPS, a permission of GPS is defined in “AndroidManifest.xml”.

2) *Google Maps*: To show the numerical values of Latitude and Longitude in a more readable form and use of Google Map is essential. To use Google Maps, a permission of GPRS or internet is defined in “AndroidManifest.xml” as well as SHA1 Fingerprint is also given.

3) *Web Service*: Comparing Buyer’s required items with the Seller’s available items and show the one which has that items and nearest to him on map. This web service continuously gets the location of buyer and send him notification when he enter/exit the fence of Seller. This web service also has a database containing records of all items and categories. To send and to receive location, items and categories through a web service JSON is used. To use a web service a permission of GPRS or internet is defined in “AndroidManifest.xml”.

a) Tools and Technologies

The tools we are using to develop the native android application is Android Studio for designing and coding purposes, SQLite database for data storage of items and web service for responding the items which are present in database.

b) Registration

Here user can select type as a Seller or Buyer to register himself. In both types on selecting one of the radio and Next Button will show below screen. After filling the credentials

when the Register button is pressed Registration will complete and below screen will appear.

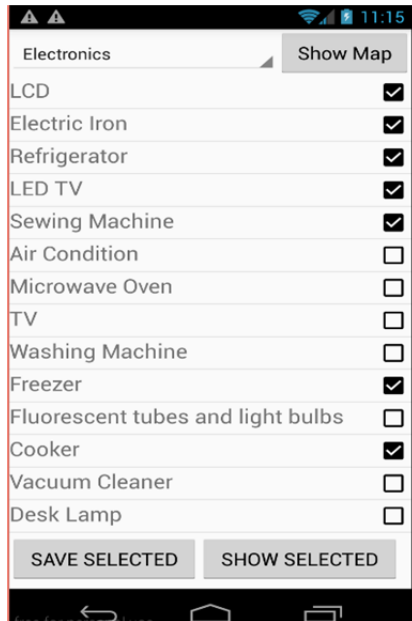


Fig. 5. List of items with multiple selection.

B. Case when Type is Seller

In case of seller after filling the credentials need to set the location of shop/store for that on Register Button click Seller can see his location on map. To set location and complete his registration he need to press Set Location button. When location is set successfully the below screen will be shown to him.

IV. CONCLUSION AND FUTURE WORK

The idea presented with prototype application called Zambeel. This prototype portrays a very basic and preliminary concepts for context based auto indexed proprietary cloud system so that a person get notified and keep informed with the possible actions to be taken with respect to environmental dynamics of space-time bound. Therefore, there are many limitations with the presented idea but in future we will present automatic proximity indexing model to extend the support of presented prototype application and optimize search results, further.

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